ABSTRACT

A vibration assisted needle device is disclosed for use in medical procedures such as needle aspiration biopsies. Reciprocation of the needle, such as a biopsy needle, eases the advance of the needle through tissue, penetration of the site of interest and the collection of sample at a site of interest. The device comprises a housing defining a chamber, a needle support external to the chamber for supporting a needle and a mechanism in the chamber for causing reciprocatory motion of the needle support. The needle support is preferably external to the housing. A syringe support may be connected to the housing for supporting a syringe. The reciprocatory mechanism may comprise means for converting rotational motion into reciprocating motion, such as a bearing or a rotor with a circumferential, angled groove on its surface, coupled to the needle support. The bearing or the rotor may be driven by a rotational motor, preferably located outside of the housing, or by a hydraulically driven turbine within the housing. Alternatively, the reciprocatory mechanism means may comprise a stationary solenoid and a movable solenoid for being coupled to the needle. Preferably, a second stationary solenoid is provided and the moving solenoid is between the two stationary solenoids. Energization of the stationary solenoid or solenoids by an alternating current for example, and energization of the movable solenoid by a direct current, or vice versa, attracts and repulses the movable solenoid, causing reciprocation of the needle. Methods and systems using the vibration assisted needle device are also disclosed.